Water Management Plan

United States Environmental Protection Agency
National Health and Environmental Effects Research Laboratory
Western Ecology Division

Willamette Research Station
1350 SE Goodnight Avenue
Corvallis, Oregon 97333

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EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL HEALTH AND ENVIRONMENTAL RESEARCH LABORATORY
WESTERN ECOLOGY DIVISION
WILLAMETTE RESEARCH STATION

WATER MANAGEMENT PLAN

Approved by:

Jay D Gile 8-31-04

Jay Gile, Facilities Manager — Date

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Kathy McBride, Associate Director for Program Operations — Date

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1.0 EPA'S STATEMENT OF PRINCIPLES ON EFFICIENT WATER USE

In order to meet the needs of existing and future populations and ensure that habitats and ecosystems are protected, the nation's water must be sustainable and renewable. Sound water resource management, which emphasizes careful, efficient use of water, is essential to achieve these objectives.

Efficient water use can have major environmental, public health, and economic benefits by helping to improve water quality, maintain aquatic ecosystems, and protect drinking water resources. As we face increasing risks to ecosystems and their biological integrity, the inextricable link between water quality and water quantity becomes more important. Water efficiency is one way of addressing water quality and quantity goals. The efficient use of water can prevent pollution by reducing wastewater flows, recycling process water, reclaiming wastewater, and using less energy.

EPA recognizes that regional, state, and local differences exist regarding water quality, quantity, and use. Differences in climate, geography, and local requirements influence the water efficiency programs applicable to specific facilities. Therefore, EPA is establishing facility-specific Water Management Plans to promote the efficient use of water and meet the water conservation requirements under Executive Order 13123, Greening the Government Through Efficient Energy Management.

This Water Management Plan has been established to document and promote the efficient use of water at the National Health and Environmental Effects Research Laboratory, Western Ecology Division (WED) Willamette Research Station in Corvallis, Oregon. The plan is organized according to the Federal Energy Management Program (FEMP) Facility Water Management Planning Guidelines under Executive Order 13123.

2.0 FACILITY DESCRIPTION

The Willamette Research Station (WRS) comprises laboratories and field research facilities on a 10-acre site adjacent to the Willamette River in Corvallis, Oregon. WRS is owned and operated by EPA. Currently, the facilities are used to support contractor activities associated with sample preparation and sample processing for EPA's Environmental Monitoring and Assessment Program (EMAP).

The site contains a main laboratory building, two greenhouses, and several other outbuildings. EPA contractor staff occupy the two-story main laboratory building, which contains laboratories on the first floor and offices on the second floor. The U.S. Geological Survey (USGS) leases one of the greenhouses, as well as two other outbuildings. USGS conducts amphibian research in Building 600 and has offices for approximately 12 people in an office trailer.

The main laboratory building and other structures were originally constructed in the 1970s, with an addition to the main laboratory completed in 1995. Collectively, the structures at WRS contain 13,297 square feet of conditioned space.

3.0 FACILITY WATER MANAGEMENT GOALS

The water management goals of WED are achieved through the implementation of an Environmental Management System (EMS). The EMS is being established and implemented consistent with the laboratory environmental management policy. The WED environmental management policy statement is provided below.

Environmental Management Policy

The U.S. Environmental Protection Agency's Office of Research and Development (ORD) mission is to perform state-of-the-art research to identify, understand, and solve current and future environmental problems, provide responsive technical support to EPA's mission, integrate the work of ORD's scientific partners (other agencies, nations, private sector organizations, and academia), provide leadership in addressing emerging environmental issues, and advance the science and technology of risk assessment and risk management.

ORD continues to encourage and set an example of research and development activities which use effective EMSs that focus on regulatory compliance, pollution prevention, resource preservation, and public outreach. With this policy, the National Health and Environmental Effects Research Laboratory - Western Ecology Division (WED) joins other ORD sites in committing to implement EMS for our own employees, operations, and facilities. Collectively, ORD will become a leader in executing a model EMS within the Agency.

At WED, we commit to reduce the environmental impacts and consumption of natural resources from our facility operations and comply with all legal and applicable requirements. Our EMS will be designed to meet the following goals:

- Ensure compliance by meeting or exceeding all applicable environmental requirements while conducting research activities;
- Strive to continuously improve environmental performance;
- Integrate source reduction and other pollution prevention approaches into day-to-day research activities;
- Consider the environment when making all planning, purchasing, and operating decisions;
- Establish, track and review specific environmental performance goals and employee awareness; and
- Share performance information with our research partners and other interested parties.

EMS Water Conservation Objectives

WED has identified the reduction of water consumption as an objective of its draft EMS, which is currently in development. The following targets have been established related to this objective:

- Consider water usage in addition to energy usage in the review of HVAC equipment for potential replacement.
- Maintain and promote water conservation awareness through e-mail and posting information.

4.0 UTILITY INFORMATION

Contact Information

Potable water supply and sewer service are provided by:

City of Corvallis
501 SW Madison Avenue
P.O. Box 3015
Corvallis, OR 97339-3015

541-766-6949

Rate Schedule

Monthly water billing is based on a tiered rate structure, provided in Table 1.

Table 1
Water Use Fee Structure

Monthly amount	Rate per 100 cubic feet (ccf)
0 to 43 ccf	$1.13
Over 43 ccf	$1.40

The utility also charges WRS a fixed rate of $17.19 per month for the installed 1-inch water meter.

The monthly billing for sewer use is also on a tiered rate structure, provided in Table 2.

Table 2
Sewer Use Fee Structure

Monthly amount	Rate per 100 cubic feet (ccf)
0 to 4 ccf	Flat fee of $18.35/month
Over 4 ccf	$2.90

Payment Office

Research Triangle Park Finance Center (RTP-FC)

(Pouch and Regular Mail)
Environmental Protection Agency
Mail Code - D143-02
Research Triangle Park, NC 27711

(FEDEX)
Environmental Protection Agency
Mail Code - D143-02
4930 Page Road
Research Triangle Park, NC 27711

The fax number for RTP-FC is: 919-541-4975

5.0 FACILITY INFORMATION

The WRS laboratory contains laboratory space for EMAP sample preparation and processing, and constant temperature chambers for sample storage.

Historically, WRS was used for aquatic research, and the facility is supplied with a continuous supply of fresh water from shallow groundwater wells located adjacent to the nearby Willamette River. This well water currently supplies the amphibian research conducted by USGS in Building 800, and is used to maintain a constant overflow to six, half-acre artificial ponds on the WRS grounds. The fresh water flow through Building 800 and the overflow from the ponds is returned to the Willamette River. The ponds are no longer in active research use. The well water is supplied by two pumps, 25 and 35 horsepower, respectively. The pumps are operated sequentially, with one in operation and the other on standby.

Potable water is obtained from the local water utility and used as process water in the laboratories, for evaporative cooling of the greenhouses and for sanitary supply. The remainder of this plan discusses potable water use throughout the facility.

Major Water Using Processes

Estimates of potable water consumption by major use area are provided in Table 3. These data reflect average facility water use between April 2003 and March 2004.

Table 3
Major Water Using Processes

Major Process	Annual Consumption (gallons)	Percent of Total	Comments
Sanitary	120,000	62	Engineering estimate
Miscellaneous process and other laboratory water	74,000	38	Calculated as remaining difference from metered total
TOTAL	194,000	100	From monthly meter readings

Additional detail on assumptions and calculations supporting these water use estimates are provided in Appendix A.

Measurement Devices

Incoming city water is metered. Metered usage is tracked monthly to monitor trends in water consumption.

Water supply from the groundwater wells is not metered.

Shut-off Valves

The city water shut-off valve is located in the hazardous material storage room.

Occupancy and Operating Schedules

Approximately 12 employees work at WRS. The laboratory operates on a flex time schedule and is typically occupied between 6:00 a.m. and 6:00 p.m., Monday through Friday. In addition to the employees occupying the EPA facility, approximately 12 USGS employees occupy a USGS leased office on site. Sanitary water for these employees is included in the total water use data provided in Table 3.

6.0 BEST MANAGEMENT PRACTICE SUMMARY AND STATUS

FEMP has identified Water Efficiency Improvement Best Management Practices (BMPs) in 10 possible areas. Implementation of BMPs in four or more areas are required under FEMP guidance. The WRS has adopted and will maintain BMPs in four of the 10 areas, as checked below:

- ✓ Public Information and Education Programs
- ✓ Distribution System Audits, Leak Detection, and Repair
- ✓ Water-Efficient Landscape
- ❑ Toilets and Urinals
- ✓ Faucets and Showerheads
- ❑ Boiler/Steam Systems
- ❑ Single-Pass Cooling Systems
- ❑ Cooling Tower Systems
- ❑ Miscellaneous High Water-Using Processes
- ❑ Water Reuse and Recycling

Additional information related to each BMP area is provided in the following sections.

Public Information and Education Programs (BMP #1)

The WRS promotes water conservation and awareness using the EPA laboratory "Every Drop Counts" water conservation poster series. Conservation posters are displayed in prominent locations within the laboratory. In addition, employees will be educated on water and other resource conservation topics though the implementation of laboratory EMS, which is being developed. The reduction of water consumption has been identified as an objective under the draft EMS. In view of this objective, the Facility Manager will maintain and promote water conservation awareness though e-mail and posting information.

Distribution System Audits, Leak Detection, and Repair (BMP #2)

A screening level system review was conducted in June 2004 to develop this plan, and known water uses account for greater than 90 percent of water consumption.

Facility staff are trained to report leaks and malfunctioning water using equipment to a facility maintenance help line. A service request is generated for each reported problem, which is completed by the facility O&M contractor. Service requests are tracked using an internet based work order management system through completion and close out. Any problems or leaks identified are addressed immediately.

Water-Efficient Landscape (BMP #3)

No irrigation is used to maintain the facility landscape. Facility grounds are covered with pasture grass which is allowed to go dormant during dry periods, and is naturally restored when precipitation occurs.

Toilets and Urinals

Construction of the laboratory occurred in the early 1970s, prior to the implementation of current water-efficient sanitary fixture standards. Toilets are the original installed equipment and have not been upgraded. Given the period of building construction, toilets are estimated to operate at

4.5 gallons per flush (gpf), rather than the current low-flow design standard of 1.6 gpf. The urinal was converted to a no-flush design in July 2004. A full inventory of sanitary fixtures is provided in Table 4.

Table 4
Sanitary Fixture Inventory

Fixture	Quantity	Flow Rate
Toilets	3	4.5 gpf
Urinals	1	no-flush
Lavatory Sinks	3	2.2 gpm
Showers	1	2.5 gpm

Janitorial staff and employees are trained to report leaks or other maintenance problems to the facility maintenance help line, which are immediately corrected.

BMP credit is not claimed at this time, pending conversion of the toilets to water efficient design standards.

Faucets and Showerheads (BMP #4)

Table 4 provides an inventory of lavatory faucets and showerheads. The faucets and showerheads were upgraded with water conserving flow restrictors in August 2004.

System pressure is maintained at 65 pounds per square inch, within the range recommended for optimum system performance.

Janitorial staff and employees are trained to report leaks or other maintenance problems to the facilities maintenance help line, which are immediately corrected.

Boiler/Steam Systems

Heat is supplied by electrical strip heaters in the original portion of the laboratory, and by a gas-fired furnace in the 1995 addition. No steam is utilized for building or domestic hot water heating. No BMP credit is claimed in this area.

Single Pass-Cooling

Unmetered well water, estimated at 1 to 2 gallons per minute (gpm), is tapped from the supply that flows through the laboratory and is used to cool the compressors on two temperature control chambers. After cooling, this water is discharged to the sanitary sewer. BMP credit is not claimed in this area.

Cooling Tower Systems

Laboratory space is cooled with an air cooled, electric air conditioner; the laboratory is not equipped with a cooling tower. No BMP credit is claimed in this area.

Miscellaneous High-Water Using Processes

De-ionized (DI) water for laboratory use is generated through a multi-step process consisting of cartridge filtration, carbon adsorption, and reverse osmosis (RO). Product water from the RO unit is used as feed water to the DI water recirculating loop. The RO unit rejects 2.4 gallons of water for every 0.4 gallons of product water. The DI water is circulated from a holding tank through an ion exchange bed and ultraviolet disinfection unit and out to the laboratories through a header system. The circulated water that goes unused is returned to the holding tank.

Given the relatively high proportion of RO reject water to product water, RO reject water may make up a significant portion of the estimated 74,000 gallon per year laboratory process water flow. No BMP credit is claimed in this area.

Water Reuse and Recycling

No BMP credit is claimed in this area.

7.0 DROUGHT CONTINGENCY PLAN

In the event of a drought or other water supply shortage, WRS will follow the water use recommendations and restrictions of the City of Corvallis. The city has a Water Supply Emergency Curtailment Plan, available at:

http://www.ci.corvallis.or.us/index.php?option=content&task=view&id=842&Itemid=1249

This plan has four defined response levels:

Stage 1 - Early Warning for a Potential Water Supply Shortage

The Stage 1 warning is reached when maximum daily production is just meeting the daily demand, or when there is expectation of a potential supply deficiency.

Stage 2 - Water Supply Shortage

A Stage 2 water shortage is reached when maximum production is not meeting daily demand and reservoir storage falls to 90% capacity.

Stage 3 - Severe Water Supply Shortage

A Stage 3 water shortage is reached when maximum production is not meeting daily demand and reservoir storage falls to 80% capacity.

Stage 4 - Critical Water Shortage

A Stage 4 water shortage is reached when maximum production is not meeting daily demand and reservoir storage falls to 60% capacity.

As a matter of general operating practice, WRS already follows most of the water conservation approaches that are recommended or could be required in response to a water supply emergency. Water is not used for decorative fountains, maintenance of paved surfaces, landscape irrigation, or washing of motor vehicles.

When voluntary or mandatory water use restrictions are instituted by the City of Corvallis under its Water Supply Emergency Curtailment Plan, the requirements are communicated through public announcements. The Facilities Manager will assemble a task force of facility and operating personnel to identify and implement modifications to facility operations to achieve additional specified reductions in water consumption if a Stage 3 or higher water supply emergency is enacted.

8.0 COMPREHENSIVE PLANNING

Consistent with the WED environmental management policy to consider the environment when making all planning, purchasing, and operating decisions, the Facilities Manager will ensure that water supply, wastewater generation, and water efficiency BMPs are taken into account during the initial stages of planning and design for any facility renovations or new construction. These factors will also be considered prior to the purchase and installation of any equipment that would measurably change facility water consumption.

9.0 OPPORTUNITIES FOR FURTHER WATER CONSERVATION

The WRS is considering the following project to improve measurement and achieve additional reductions in water use:

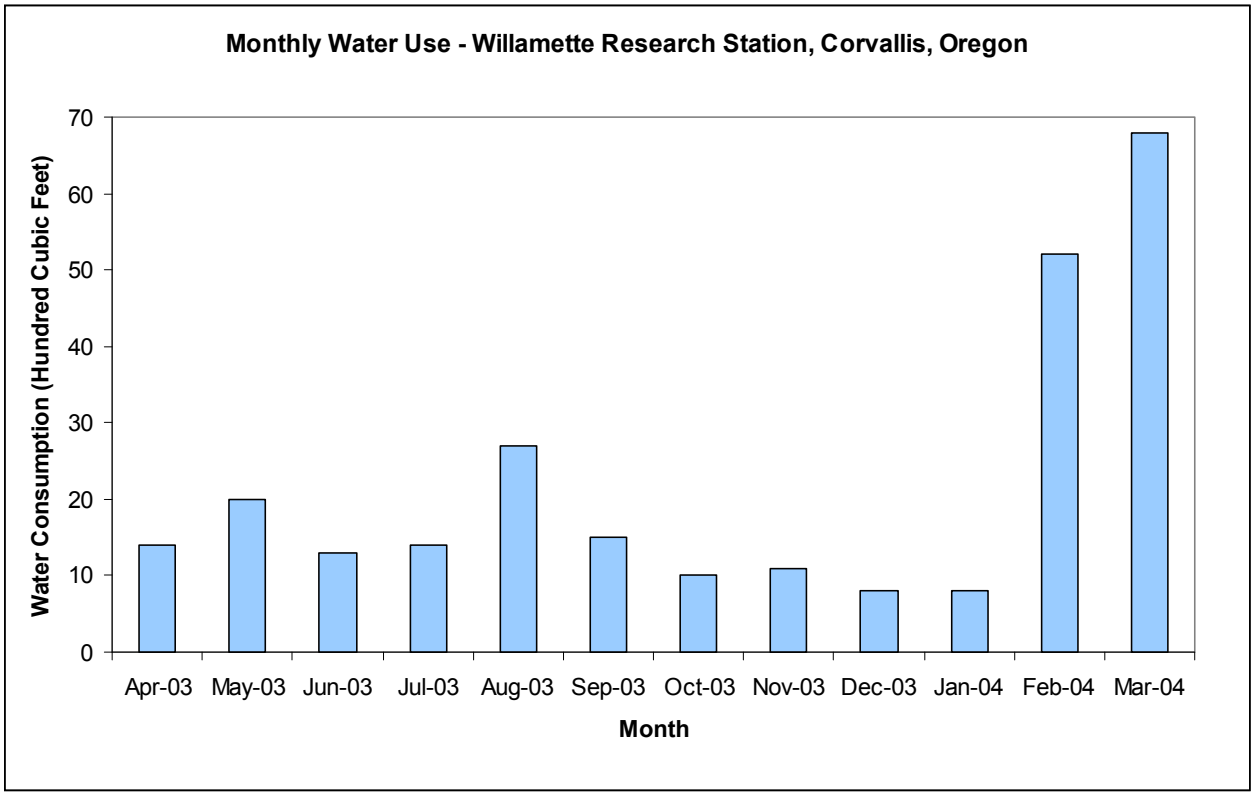
1) Upgrade Toilets. The laboratory will consider upgrading toilets to low flow design (1.6 gpf). Three toilets could be upgraded. At an installed cost of $500 per fixture, simple payback is approximately 12 years, at current water rates. This upgrade is estimated to save 23,000 gallons and $120 per year.

APPENDIX A
WATER USE AND WATER BALANCE SUPPORTING CALCULATIONS

Willamette Research Station, Corvallis, Oregon

Major Process	Annual Consumption (gallons)	Supporting Calculations
Sanitary	120,000	Nominal monthly water use was 10,000 gallons per month during past three winter seasons, when sample preparation was not active. This is equivalent to 20 gallons per person per day, which is judged reasonable for sanitary water consumption. 10,000 gallons per month × 12 months = 120,000 gallons.
Miscellaneous process and other laboratory water	74,000	Calculated by difference from metered total. 194,000 - 120,000 = 74,000 gallons
TOTAL	194,000	From monthly meter readings, April 2003 to March 2004

Monthly Water Use Data



Monthly Water Use
100 Cubic Feet

Month	Water Use
Apr-03	14
May-03	20
Jun-03	13
Jul-03	14
Aug-03	27
Sep-03	15
Oct-03	10
Nov-03	11
Dec-03	8
Jan-04	8
Feb-03	52
Mar-03	68